CHAPTER IV E

Sutter National Wildlife Refuge Alternative Plans

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION

CHAPTER IV E

SUTTER NATIONAL WILDLIFE REFUGE

Sutter National Wildlife Refuge (NWR) was established in 1944 under the Lea Act which authorized and appropriated funds for the purchase of land for migratory waterfowl in the Sacramento Valley. The refuge was originally established to reduce crop losses due to waterfowl. Additional lands were acquired in 1953 and 1956 with funds provided by the Buck Stamp Act. The 2,394-acre refuge is managed by the Service and is located in Sutter County 8-miles southwest of Yuba City. Most of the refuge is within the Sutter Bypass, north of the confluence with the Tisdale Weir, as shown in Figure IV E-1. This refuge is the only publicly-owned wildlife management area in the Sutter Basin.

Sutter Basin extends from the Sutter Buttes on the north to the confluence of the Feather and Sacramento Rivers and drains north to south. Historically, flood flows from the Sacramento River, Butte Sink, and Feather River have inundated large portions of the 57,000-acre Sutter Basin year-round. However, most of the land has since been developed for agricultural uses, including rice fields which utilize the flood flows. Most of the private duck clubs in the Sutter Basin are rice fields located within the levees of the Sutter Bypass.

Sutter NWR consists of ponds, rice and millet fields, and uplands. The natural ponds support sources of waterfowl food such as timothy grass and invertebrate populations. Rice and millet are raised for waterfowl food. The upland areas of the refuge provide habitat for geese, upland birds, and other wildlife species.

A. WATER RESOURCES

Sutter NWR receives water from two drainage courses in the Sutter Bypass: the East and West Borrow Ditches and the Sutter Extension Water District facilities, and from groundwater. The Service estimates that the water needed to optimally manage the lands within the refuge is 30,000 acre-feet annually.

1. Surface Waters

Over 85 percent of the water supply for Sutter NWR is obtained from the East and West Borrow Ditches of the Sutter Bypass, as shown in Table IV E-1. The refuge holds three water rights in the Bypass. License 4590, obtained in 1946 with Priority No. 24, allocates 25 cfs from June 1 to October 30 to be diverted from the East Borrow Pit for irrigation of 1000 acres inside of the Bypass; License 3149, obtained in 1946 with Priority No. 25, appropriates 5 cfs from April 15 to October 1 to be diverted from the East Borrow Pit for irrigation of 270 acres inside of the Bypass; License 6996, obtained in 1957,

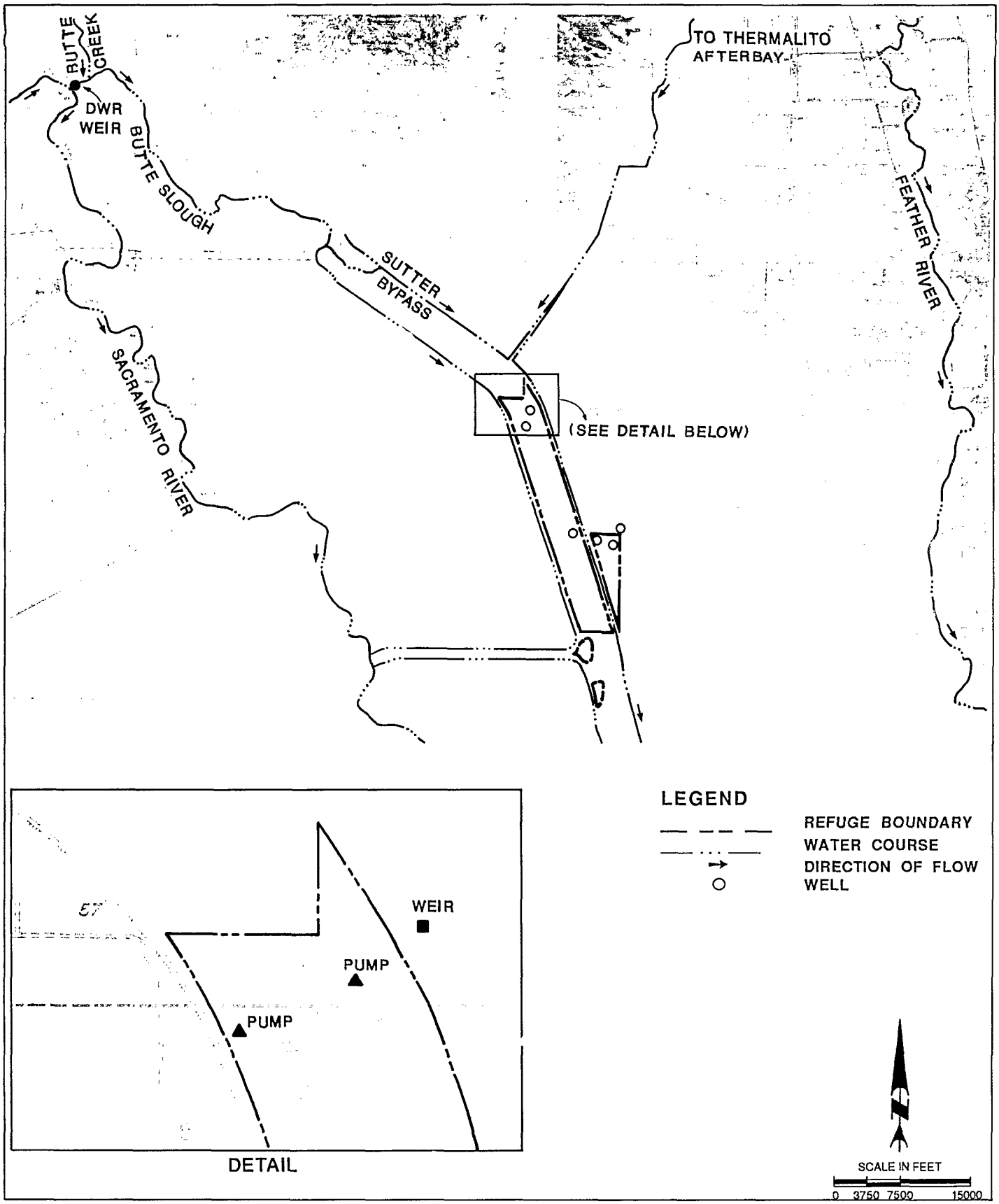

FIGURE IV E-1

SUTTER NATIONAL WILDLIFE REFUGE

EXISTING WATER SUPPLY FACILITIES

JMM

TABLE IV E-1

WATER DELIVERIES

SUTTER NWR

(acre-feet)

Year	East Borrow Ditch	West Borrow Ditch	Sutter Extension Water District	Total
1977[1]	5,852	1,890	3,750	11,492
1978	0[2]	0[2]	3,750	3,750
1979	15,092	3,050	1,916	20,058
1980	13,133	3,677	3,758	20,568
1981	11,084	3,548	1,536	16,168
1982	14,734	3,030	3,930	21,694
1983	10,630	2,326	2,968	15,924
1984	14,658	2,688	1,760	19,106
1985	18,420	3,584	3,982	25,968
1986	13,940	2,550	2,672	20,162
1987	13,852	1,560	2,054	17,466

(1) Drought year; only limited water available.

(2) No water diverted to refuge lands inside the Sutter Bypass due to construction activities.

Source: USBR, 1986a

appropriates 10 cfs of water outside of the Bypass in from State main drainage canal on the east side of the East Sutter Bypass levee from October 1 to January 1 for irrigation of 450 acres. These water rights do not have a high priority number and cannot be considered to be a dependable water source. The water right under License 6996 is not used due to poor water quality and limited availability. An outbreak of botulism occurred throughout the Sutter Basin in 1976 as a result of the poor water quality. During the irrigation season, most of the water in the Bypass is agricultural return flows. Flood flows are conveyed in the Bypass during the winter.

Water has been purchased from Sutter Extension Water District by cooperative farmers for Tracts 18, 19, and 20 which are located outside of the Sutter Bypass. The Sutter Extension Water District is a member of the Sutter-Butte Joint Water District which owns and operates the Sutter-Butte Canal that conveys water from the Thermalito Afterbay. The Sutter Extension Water District could be a potential future supply.

The Western Canal Water Users Association (WCWUA) was formed in 1985 when the PG&E canal facilities were purchased. The canal facilities divert water from Thermalito Afterbay and are operated year-round to deliver water to duck clubs in the Butte Sink. The WCWUA could convey water to Butte Creek for conveyance to the Sutter Bypass. However, the additional water in Butte Creek could be illegally diverted upstream of the Sutter Bypass.

Another potential source of water is the Oroville-Wyandotte Irrigation District which obtains water from the Thermalito Afterbay. The water could be conveyed by the Sutter-Butte Joint Water District members.

2. Water Conveyance Facilities

Water is pumped from the East Borrow Pit to the refuge from a DWR weir structure. Another weir structure has been proposed by the DWR which would be one-foot lower than the existing weir. Therefore, the refuge pumping costs would be increased. Water also is diverted from the West Borrow Pit at a dam near the southwest corner of the refuge. Water is pumped from the Sutter Extension Water District Lateral F2 to serve Tracts 18, 19, and 20.

The Sutter NWR conveyance system is in good condition. However, the refuge needs to work with DWR to develop compatible design criteria for the new DWR weir structure.

3. Groundwater

Sutter NWR is located along the margin of the Sacramento River flood basin deposits and the low alluvial plain deposits of streams that drain the Sierra Nevada Mountains. Two aquifers of different quality occur under the refuge. Water with high specific conductivities is located at depths of 350 to 750 feet

and is overlain by higher quality water. If the better quality water is pumped at high rates, the water with the high specific conductivities will rise and contaminate the good quality water. The best well production is anticipated to occur in the southwestern corner of the refuge which is underlain by deep lenses of sand and gravel and high quality groundwater is located within 200 feet of the ground surface. Based upon existing data, the quality appears to be suitable for irrigation and waterfowl needs. The safe yield of the aquifer under has been estimated by the Reclamation to be 3,110 acre-feet. The average discharge rate for pumps in the southwestern portion of the refuge is estimated to be 2,500 gpm.

The refuge has six wells which can be used to supplement water flows in a conjunctive use program. The pumping capacity of the wells range from 1,800 to 3,000 gpm. The groundwater quality is good for irrigation and wildlife uses. A deep well is used by Tracts 18, 19, and 20 when water is not available from Sutter Extension Water District.

B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

To provide for full development of the refuge, the annual water requirement is estimated by the Service to be 30 ,000 acre-feet. However, for the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified, as presented in Table IV E-2. Each of the water supply levels provide a different rate and volume of water, and are summarized as follows:

Level 1 - Existing firm water supply

Level 2 - Current average annual water deliveries

Level 3 - Water supply needed for full use of existing development

Level 4 - Water delivery needed for optimum management

Multi-objective project evaluation procedures, in accordance with concepts outlined by the Water Resources Council, is one of the tools used in evaluating and comparing alternatives. The Water Contracting EIS's will evaluate the national, regional, and site specific environmental impacts of providing water to the refuges and other users under the different water supply levels. Based on the results of the Water Contracting EIS's, water supply levels will be identified for each refuge. Following completion of the Water Contracting EIS's, the plans to meet the identified water level will be compared under the National Economic Development Account, Environmental Quality Account, and Social Account.

The beneficial and adverse effects of each alternative to provide additional water in the western portion of the refuge also were compared with respect to many criteria. A summary comparison of

TABLE IV E-2

DEPENDABLE WATER SUPPLY NEEDS

ALTERNATIVE SUPPLY LEVELS FOR THE SUTTER NWR

Month	Supply Level 1		Supply Level 2		Supply Level 3		Supply Level 4	
	ac-ft	cfs	ac-ft	cfs	ac-ft	cfs	ac-ft	cfs
January	0	0.0	950	15.5	1,200	19.5	1,200	19.5
February	0	0.0	1,000	18.0	1,300	23.4	1,300	23.4
March	0	0.0	1,000	16.3	1,300	21.1	1,300	21.1
April	0	0.0	950	16.0	1,200	20.2	1,200	20.2
May	0	0.0	1,100	17.9	1,440	23.4	1,440	23.4
June	0	0.0	1,300	21.8	1,680	28.2	1,680	28.2
July	0	0.0	1,300	21.1	1,680	27.3	1,680	27.3
August	0	0.0	3,800	61.8	4,800	78.1	4,800	78.1
September	0	0.0	4,500	75.6	5,800	97.5	5,800	97.5
October	0	0.0	3,800	61.8	4,800	78.1	4,800	78.1
November	0	0.0	1,900	31.9	2,400	40.3	2,400	40.3
December	0	0.0	1,900	30.9	2,400	39.0	2,400	39.0
Total	0	0.0	23,500	388.6	30,000	496.2	30,000	496.2
Maximum	0	0.0	4,500	75.6	5,800	97.5	5,800	97.5

Notes:

Alternative 1 Existing firm water supply
Alternative 2 Current average annual water deliveries
Alternative 3 Full use of existing development
Alternative 4 Optimum management

Source: USBR, 1986a; USFWS, 1986d

the alternatives to provide additional water to the refuge for water supply levels 1, 2, 3, and 4 is presented in Table IV E-3. The following delivery alternatives have been considered to convey the identified levels of water supply described above.

1. Delivery Alternative for Level 1 (No Action Alternative)

The refuge does not have a firm water supply, therefore no facilities were considered for this supply. If interim contracts are not renewed, the elimination of water deliveries would adversely impact the refuge.

2. Delivery Alternatives for Level 2

This level of water delivery represents the current average water delivery. Although existing facilities are capable of transporting flows from the East and West Borrow Ditches and through the Sutter Extension Water District, these current water supplies are not considered to be dependable water supplies. The following alternatives have been developed to improve the reliability and quality of water provided to the refuge.

Alternative A - Deliver Water from Thermalito Afterbay through Butte Creek. Under this plan, water from Thermalito Afterbay or Oroville-Wyandotte Irrigation District could be delivered by the WCWUA to Butte Creek. The water would flow down Butte Creek, as shown in Figure IV E-2, to the Sutter Bypass and could be diverted from the East and West Borrow Ditches. The capacity of the WCWUA system is 1,200 cfs and the capacity of Butte Creek is 650 cfs. Both of these systems would have adequate capacity to convey a maximum of 100 cfs to the refuge. During this study, the WCWUA indicated that the maintenance shut-down period could be reduced to allow water delivery to the refuge. The water could be purchased from the State Water Project. This conveyance plan was used during the 1977 drought period to convey water to the refuge.

Alternative B - Deliver Water from Thermalito Afterbay through Wadsworth Canal. Under this plan, water would be conveyed from the Thermalito Afterbay or from the Thermalito Afterbay through the Sutter-Butte Canal to the Wadsworth Canal. Water would flow from the Wadsworth Canal into the Sutter Bypass and would be diverted from the East Borrow Ditch. The capacity of the Sutter-Butte Canal is 1,950 cfs at the Thermalito Afterbay and 500 cfs at the turnout for the Sutter Extension Water District. Therefore, adequate capacity is available for conveyance of the maximum of 100 cfs to the refuge. An additional 250 cfs of water could be provided by the Sutter Extension Water District which could pump water from its Sunset Pump Station on the Feather River through laterals to the refuge. However, the

TABLE IV E-3

SUMMARY COMPARISON OF WATER DELIVERY ALTERNATIVES

SUTTER NWR

	Supply Levels 2, 3, & 4			
	Alternative A	Alternative B	Alternative C	Alternative D
Availability of Water Supply	Maybe	Maybe	Yes	Yes
Ability to Convey Water	Yes	Yes	Yes	Yes
Need New Water	Yes	Yes	Yes	No
Need New Conveyance Agreements	Yes	Yes	Yes	No
Type of Water Supply	Fresh Water	Fresh Water	Fresh Water	Groundwater
Operational Flexibility	Yes	Yes	Yes	Yes
Wildlife Habitat	Improve	Improve	No Change	Improve
Public Use	No Change	No Change	No Change	No Change
Total Annual Costs ($)[a]	135,000	135,000	135,000	78,360

Notes: Alternative A: Deliver Water from Thermalito Afterbay through Butte Creek.
Alternative B: Deliver Water from Thermalito Afterbay through Wadworth Canal.
Alternative C: Long Term Agreement with Sutter Extention Water District.
Alternative D: Conjunctive Use

(a) Total Annual Costs includes annualized construction cost, annual operation and maintenance cost, annual power and wheelage cost.

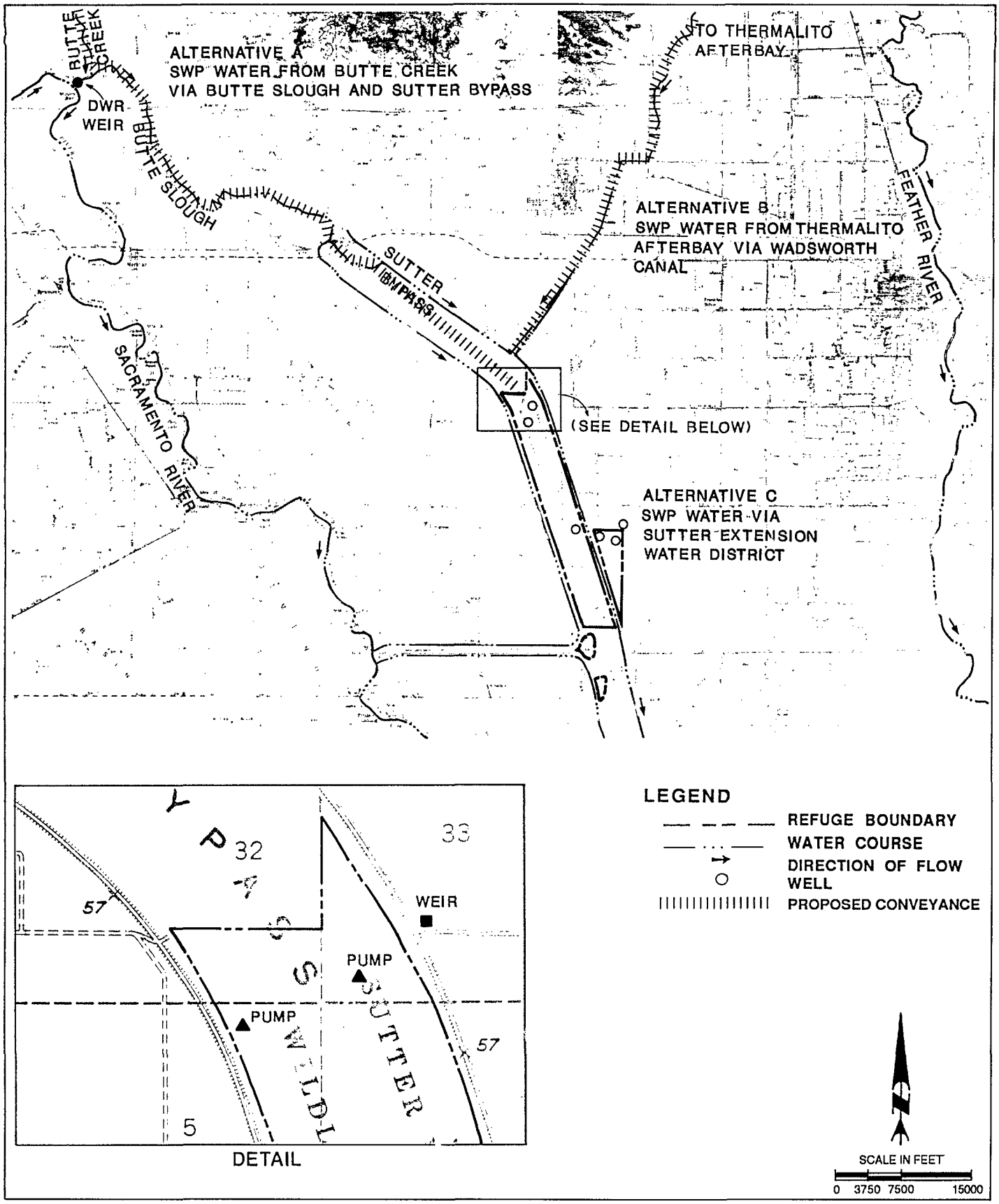

FIGURE IV E-2

SUTTER NATIONAL WILDLIFE REFUGE

PROPOSED WATER SUPPLY FACILITIES
ALTERNATIVES A, B, & C

JMM

C—067746

C-067746

Sutter-Butte Canal and the Sutter Extension Water District laterals are usually shut-down for maintenance from November to April. Over 25 miles of canals would require lining which would reduce maintenance requirements and provide for a longer operating season.

Alternative C - Obtain Water from Sutter Extension Water District. A long-term agreement with Sutter Extension Water District could be developed under this plan to provide a dependable water supply for Tracts 18, 19, and 20.

Alternative D - Implement a Conjunctive Use Plan. Under this alternative, wells would be constructed to be used as part of a conjunctive use program (as defined in Chapter II). The wells could be used during the winter when the supply canals are shut-down or during drought periods.

3. Delivery Alternatives for Level 3

Water deliveries under Level 3 are similar to the current average water deliveries (Level 2) except that additional water deliveries would be provided. Therefore, the same alternatives considered for Level 2 would be evaluated for Level 3.

4. Delivery Alternatives for Level 4

No new lands would be developed at the Sutter NWR. The water deliveries under Level 4 would be equal to the deliveries under Level 3. Therefore, the alternatives for Level 4 would be the same as discussed under Levels 2 and 3.

5. Summary of Alternatives

There are no alternatives for Level 1. Alternatives A, B, C, and D have been considered for implementation of Levels 2, 3, or 4. The alternatives were primarily developed to provide a dependable supply of good quality water to the refuge.

Alternative A would require long-term conveyance agreements with WCWUA to transport additional water to the refuge. Alternative B would require long-term agreements with the Sutter-Butte Joint Water District and Sutter Extension Water District. Alternative A does not require construction and operation of additional facilities and has a lower operating cost than Alternative B. Alternative B requires extensive improvements to existing canal structures. Both alternatives require long-term agreements to obtain water from Thermalito Afterbay.

C. COSTS & ECONOMIC ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Levels 1, 2, 3, and 4 are presented in Table IV E-4

TABLE IV E-4

SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES

SUTTER NWR

Items	Water Delivery Levels 2, 3, and 4 Alternatives			
	A	B	C	D
Total Construction Costs	0	0	0	$149,500
Power Costs ($/acre-foot)	0.00	0.00	0.00	18.90
Water Wheeling Costs ($/acre-foot)	$ 4.50	$ 4.50	$ 4.50	0.00
Annualized Construction Costs (8.875%, 30 years)	0	0	0	14,380
Annual Operations & Maintenance Costs	0	0	0	5,200
Annual Power Cost	0	0	0	58,780
Annual Water Wheelage Costs	135,000	135,000	135,000	0
Total Annual Costs	$135,000	$135,000	$135,000	$ 78,360

Alternative A - Deliver water from Thermalito Afterbay through Butte Creek.

Alternative B - Deliver water from Thermalito Afterbay through Wadsworth Canal.

Alternative C - Long-term Agreement with Sutter Extension Canal Water District.

Alternative D - Conjuctive Use.

and the Design Estimates Appendix. The construction costs include factors to cover engineering, contingencies, and overhead. During the advanced planning phase, these costs will be refined further.

Construction of the facilities under the alternative plans would result in additional money being spent in the economy of Sutter County during construction of well fields. The construction could be completed within one summer season by construction workers who reside within the area. Because the refuge is fully developed, the additional water may not increase public use levels but would allow for continued public use.

D. WILDLIFE RESOURCES

The average annual waterfowl use on the Sutter NWR is over 9,440,000. Over 93 percent of the waterfowl were ducks. Wildlife and fishery resources associated with the refuge are presented in Table IV E-5. The only listed threatened and endangered species associated with Sutter NWR are the bald eagle, Haliacetus lecicocephalus; peregrine falcon, Falco peregrines; Aleutian Canada goose, Branta canadensis Leucopareia; and the Valley elderberry longhorn beetle, Desmocerus californicus dimorphus. Candidate species associated with the Sutter NWR include the white-faced ibis, Plegadis chichi; tricolored blackbird, Agelaius tricolor; and California hibiscus, Hibiscus californicus, as listed in Table IV E-6.

The alternative plans would provide a dependable water supply. As all portions of Sutter NWR have developed water transportation systems, additional water would be used to improve habitat rather than to develop additional wetlands. The improved habitat would increase the number of waterfowl use days and recreational benefits, as indicated in Table IV E-7.

Implementation of alternative plans would not adversely effect the listed and candidate threatened and endangered species of wildlife and would improve habitat that could be used by the white-faced ibis. Detailed field investigations will be completed during the advanced planning phase of the project. Implementation of the plan would result in overall beneficial environmental effects. The No Action Plan could result in the loss of habitat if interim water supplies are not available in the future. The results of the preliminary environmental account analysis for the alternative plan are presented in the Environmental Appendix. Additional environmental analyses will be completed as part of the Water Contracting EIS's.

E. SOCIAL ANALYSIS

The social consequences of operating the facilities of the selected plans would be positive due to the potential increase in public use. The local social environment is discussed in the Social Appendix.

TABLE IV E-5

WILDLIFE RESOURCES

SUTTER NWR

Ducks

Hooded Merganser
Mallard[a]
Gadwall[a]
European Wigeon
American Wigeon
Green winged Teal[a]
Cinnamon Teal[a]
Blue Winged Teal[a]
Northern Shoveler[a]
Pintail[a]
Wood Duck[a]
Redhead[a]
Canvasback
Ruddy Duck[a]
Ring Necked Duck
Common Goldeneye
Greater Scaup
Lesser Scaup
Buffle Head
Common Merganser[a]

Geese and Swans

Snow Goose
Ross Goose
White-fronted Goose
Canada Goose
Cackling Goose
Lesser Canada
Whistling Swan

Coots

American Coot[a]

Shore and Wading Birds

Western Grebe[a]
Eared Grebe
Pied-billed Grebe[a]
Double-crested Cormorant
White Pelican
American Bittern[a]
Least Bittern[a]
Great Blue Heron[a]
Great (common) Egret[a]
Snowy Egret[a]
Green Heron[a]
Virginia Rail[a]
Sora[a]
Common Gallinule[a]
Ring-billed Gull
Caspian Tern[a]
Forester's Tern
Black Tern[a]
Wilson's Phalarope
American Avocet
Black-Necked Stilt
Common Snipe
Long-billed Dowitcher
Least Sandpiper
Dunlin
Western Sandpiper
Greater Yellowlegs
Long-billed Curlew
Killdeer[a]
Black- crowned Night Heron[a]
Greater Sandhill Crane

TABLE IV E-5

WILDLIFE RESOURCES

SUTTER NWR

Ducks

Hooded Merganser
Mallard[a]
Gadwall[a]
European Wigeon
American Wigeon
Green winged Teal[a]
Cinnamon Teal[a]
Blue Winged Teal[a]
Northern Shoveler[a]
Pintail[a]
Wood Duck[a]
Redhead[a]
Canvasback
Ruddy Duck[a]
Ring Necked Duck
Common Goldeneye
Greater Scaup
Lesser Scaup
Buffle Head
Common Merganser[a]

Geese and Swans

Snow Goose
Ross Goose
White-fronted Goose
Canada Goose
Cackling Goose
Lesser Canada
Whistling Swan

Coots

American Coot[a]

Shore and Wading Birds

Western Grebe[a]
Eared Grebe
Pied-billed Grebe[a]
Double-crested Cormorant
White Pelican
American Bittern[a]
Least Bittern[a]
Great Blue Heron[a]
Great (common) Egret[a]
Snowy Egret[a]
Green Heron[a]
Virginia Rail[a]
Sora[a]
Common Gallinule[a]
Ring-billed Gull
Caspian Tern[a]
Forester's Tern
Black Tern[a]
Wilson's Phalarope
American Avocet
Black-Necked Stilt
Common Snipe
Long-billed Dowitcher
Least Sandpiper
Dunlin
Western Sandpiper
Greater Yellowlegs
Long-billed Curlew
Killdeer[a]
Black- crowned Night Heron[a]
Greater Sandhill Crane

TABLE IV E-5

WILDLIFE RESOURCES

SUTTER NWR
(Continued)

Upland Game		
Ringed-neck Pheasant[a]	Rock Dove	Mourning Dove[a]
Raptorial Birds		
Turkey Vulture	White-tailed Kite[a]	Marsh Hawk
Sharp-shinned Hawk[a]	Cooper's Hawk[a]	Red-tailed Hawk[a]
Rough-legged Hawk	American Kestrel[a]	Barn Owl[a]
Great Horned Owl[a]	Red Shouldered Hawk[a]	Golden Eagle
Bald Eagle		Peregrine Falcon
Fish		
Steel head	Salmon	Largemouth Bass
Catfish	Black Crappie	
Furbearers		
Oppossum	Gray Fox	Coyote
Raccoon	Beaver	Mink
Skunk	Muskrat	
Others		
	California Quail[a]	Black-tailed Deer

Notes:

(a) Birds nesting on refuge

Source: USFWS computerized annual printout for NWR Birds, Department of Interior, USFWS (RF11650-2 9-79) (July 1973 to June 1974, NWRS Public Use Report (1)) and refuge records.

TABLE IV E-6

LISTED, PROPOSED, & CANDIDATE, THREATENED & ENDANGERED SPECIES

SUTTER NWR

Listed Species

Birds

Aleutian Canada goose, Branta canadensis Leucopareia (E)
Bald Eagle, Haliacetus leucocephalus (E)
Peregrine Falcon, Falco peregrines (E)

Invertebrates

Valley elderberry longhorn beetle, Desmocerus californicus dimorphus (T)

Proposed Species

None

Candidate Species

Birds

White-faced ibis, Plegadis chihi (2)
Tricolored blackbird, Agelaius tricolor (2)

Plants

California hibiscus, Hibiscus californicus (2)

Source: USFWS, June 4, 1987

(E)--Endangered (T)--Threatened (CH)--Critical Habitat
(1)--Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.
(2)--Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

C-067753

TABLE IV E-7

WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS

SUTTER NWR

Item	Water Delivery Levels			
	Level 1	Level 2	Level 3	Level 4
Habitat Acres				
Permanent Pond	0	73	85	85
Seasonal Marsh	0	1,047	1,250	1,250
Watergrass	0	865	1,100	1,100
Rice	0	0	0	0
Bird Use Days				
Ducks	0	8,800,000	10,000,000	10,000,000
Geese	0	460,000	550,000	550,000
Waterbirds	0	180,000	215,000	215,000
Endangered Species	0	20	20	20
Public Use Days				
Consumptive	0	3,600	3,600	3,600
Non-Consumptive	0	0	0	0
Annual Recreational Benefits	0	$ 77,980	$ 77,980	$ 77,980

F. POWER ANALYSIS

PG&E serves the Sutter NWR under the PA-1 rate schedule for agricultural users. A facility must be an authorized function of the CVP to receive project-use power. The authority to deliver the CVP power to the refuge is currently being examined and will be detailed in the Refuge Water Supply Planning Report. A more detailed discussion of project-use power and wheeling agreements is provided in the Power Analysis section of Chapter IV-B.

G. PERMITS

To obtain additional State Water Project water, approvals from DWR would be required. Agreements with WCWUA and Sutter Extension Water District for water conveyance also would be required for the preferred alternative. Sutter County would issue permits for construction of the wells.